

Claims

1. A method for drilling for petroleum, comprising the steps of
 - (a) erecting a derrick assembly on the ground;
 - (b) mounting a drill on said derrick assembly, said drill including a hollow drill pipe
5 having an upper end and a lower end and a drill bit attached to the lower end;
 - (c) mounting a rotary assembly at said derrick assembly to provide motive power to rotate said drill bit in the ground to produce drill bit cuttings;
 - (d) mounting a drilling mud circulation system at said derrick assembly to direct
10 drilling mud into said upper end of said drill pipe, down through said drill pipe, out the lower end of said drill pipe, and up through a hole in the ground to produce auxiliary drilling mud containing drill bit cuttings ;
 - (e) providing a source of drilling mud for said circulation system, said mud comprising water and at least one additive selected from the group consisting clay and auxiliary chemical additives to facilitate drilling;
 - 15 (f) erecting a first particle separation apparatus including
 - (i) a wall defining a separation chamber,
 - (ii) a feed orifice formed in said chamber,
 - (iii) a rotary distributor in said chamber provided with rotating distribution disk system including an upper surface,
 - 20 (iv) a system for rotatably driving said rotary distributor,
 - (v) an outlet formed in said wall,
 - (vi) an open toroidal-shaped particle circulation space intermediate said disk system and said outlet and circumscribed by a portion of said wall, said outlet opening into said toroidal-shaped space,
 - 25 (vii) a charging system for charging auxiliary drilling mud through said orifice into said separation chamber toward said rotary distributor such that the auxiliary drilling mud, in part, impinges said upper surface, said rotary distributor providing the motive power to move
at least a portion of the auxiliary drilling mud outwardly over

said upper surface and into said chamber away from said rotary distributor,

a first portion of the auxiliary drilling mud over said upper surface and into said chamber in a primary continuous helical path of travel away from said rotary distributor and said orifice through said toroidal-shaped space toward and into said outlet,

a second portion of the auxiliary drilling mud in a secondary recirculating helical path of travel away from said rotary distributor and said orifice through said toroidal-shaped space toward said outlet and away from said outlet back toward said rotary distributor;

(g) rotating said drill into the ground with said rotary assembly to form said hole in the ground and produce drill bit cuttings in said hole, said hole having a top and a side;

(h) circulating drilling mud with said mud circulation system along a path down into said upper end of said drill pipe, through said drill pipe, out said lower end of said drill pipe, up through said hole intermediate said drill pipe and said side of said hole, and out through said top of said hole, to produce the auxiliary drilling mud containing drill bit cuttings; and,

(i) transporting to said charging system auxiliary drilling mud, said charging system directing the cutting-containing drilling mud through said orifice into said separation chamber toward said rotary distributor such that the drilling mud, in part, impinges said upper surface.